

24 November 2010, rospacongresseval2009



## Evaluating Occupational Road Safety Programmes: A Process and Outcomes Based Approach

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### SUMMARY

A great deal of interest has developed in the UK over recent years in improving transport safety and risk management. This paper aims to provide practical guidelines on how safety performance, successful or otherwise, can be evaluated. It shows how quantitative, cost and qualitative based key performance indicators (KPIs) can be developed. The paper argues the case for a range of KPIs to be monitored, as a way to assess the success of past programmes and to help develop new ones.

This paper was drawn mostly from:

Murray, W., Newnam, S., Watson, B., Davey, J. & Schonfeld, C. (2003). Evaluating and improving fleet safety in Australia. Canberra: ATSB.

[www.infrastructure.gov.au/roads/safety/publications/2003/eval\\_fleetsafe.aspx](http://www.infrastructure.gov.au/roads/safety/publications/2003/eval_fleetsafe.aspx)

Based on the most recent global research findings on occupational road safety, the need for robust evaluation remains as strong as ever. See:

Murray, W., Pratt, S., Hingston, J. & Dubens, E. (2009). Promoting Global Initiatives for Occupational Road Safety: Review of Occupational Road Safety Worldwide (Draft).

[www.cdc.gov/niosh/programs/twu/global](http://www.cdc.gov/niosh/programs/twu/global)

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## 1 INTRODUCTION

This paper is about the following issues.

- The range of options available for evaluating risk management programmes.
- Developing relevant incident based, financial and qualitative key performance indicators (KPIs) for transport safety and risk management programmes.
- Evaluating existing transport safety programmes to highlight further issues to be addressed.

The monitoring and evaluation of transport safety programmes is important for the simple reason that 'what gets measured gets bettered'! If you do not measure something, it is very difficult to know if or how much you have improved it. As with any programme, evaluation is a key stage in the continuing process of risk management. The purpose of evaluating a transport safety risk management programme is to assess the effectiveness of the interventions made in terms of both the overall process and the success of the outcomes. It should take place at a range of different levels, including: the individual driver, depot, division/region, company, and industry.

As well as assessing the situation to date, evaluation must also lead into the next stage of the programme and be part of the feedback/selling process of 'keeping the safety message high'. Too much attention is often paid to 'who is at fault'? Effective evaluation of a safety programme must look for corrective actions, should aim to improve as much as prove and be an integral and regular (weekly, monthly, quarterly, yearly) part of the management process.

Evaluation of transport safety and risk management programmes should focus on a combination of: incident rates, incident costs and qualitative issues. All these measures need to be used to give as objective a view as possible about the success of the programme. They can also be used and applied to identify steps for further action. None of the methods, however, is perfect.

- Incident rates are very difficult to compare, sometimes even within the same organisation.
- The total costs of an excellent programme can easily be distorted by one major incident.
- Qualitative success will not satisfy the accountant or the shareholders.

It is also very difficult to know what would have happened if no action had been taken. A transport safety programme may not have reduced accidents, but it is impossible to say what the costs or incident rate would have been if the programme had not been implemented. The programme may have stopped a long upward trend or prevented a major increase. In many cases a transport safety programme may actually show an initial increase in incidents, because the first stage is often to begin to count incidents that previously went unnoticed!

Finally the evaluation must cater for the views, objectives and needs of a range of groups, including: external organisations such as the press, the government and a range of pressure groups; shareholders and the 'city'; senior managers; accountants; line managers and supervisors; drivers and vehicle schedulers; personnel managers; the unions; insurers; health and safety managers; and the public relations (PR) department.

The following sections provide key performance indicators (KPIs) for measuring the success of a transport safety improvement programme. They cover incident rates, incident costs and qualitative measures.

## 2 QUANTITATIVE INCIDENT RATES

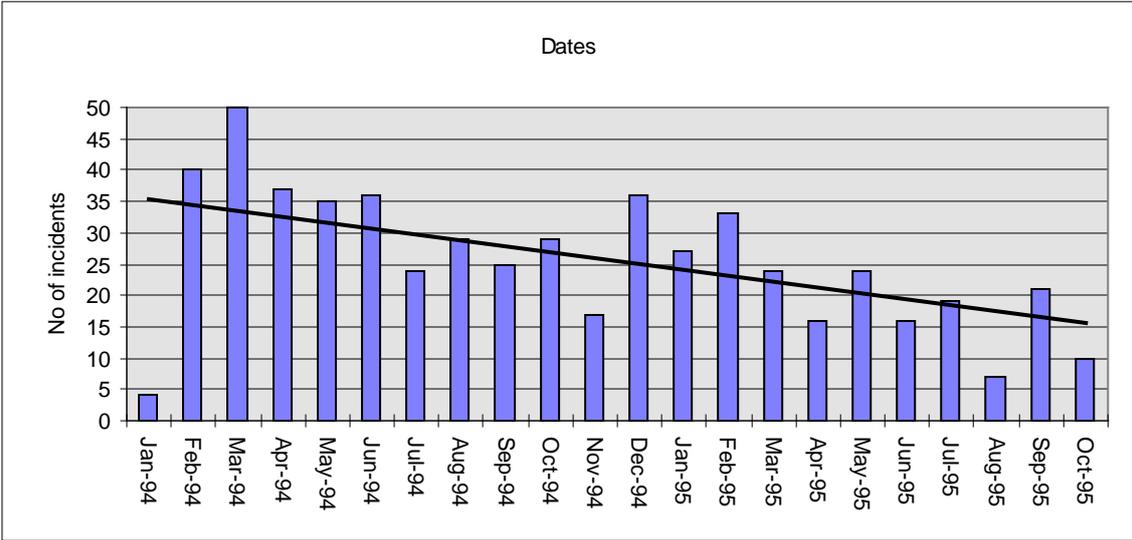
Incident rates are an important way of measuring the success of a programme. They should be kept as simple as possible and be presented briefly. They should also include clear trend graphs and a minimal amount of data. Table 1 shows several ways of measuring incident rates.

Table 1 - Simple ways to count vehicle incidents

<b>Simple ways to count vehicle incidents</b>
number of incidents per week/month/quarter/year
number of claims
numbers of injuries
number of vehicle write-offs

The more simple measures, such as counting the number of incidents, can indicate useful trend information, as shown in Graph 1. The trend line in Graph 1 is also useful as it shows the obvious success of the company’s programme from when the analysis was started during January 1994.

Graph 1 - Incidents by month



The main limitation of this data is that it does not relate the number of incidents to the number of vehicles or the amount of work being undertaken. This means that it is very difficult to compare different sites, divisions or companies. Counting only the number of claims, injuries or vehicle write-offs is also important, but on their own these statistics are of only limited use for evaluation purposes. All these approaches miss a large proportion of the incidents, and may actually mask the true problems and areas of risk. It is strongly recommended that all incidents, however minor, should be included for evaluation purposes.

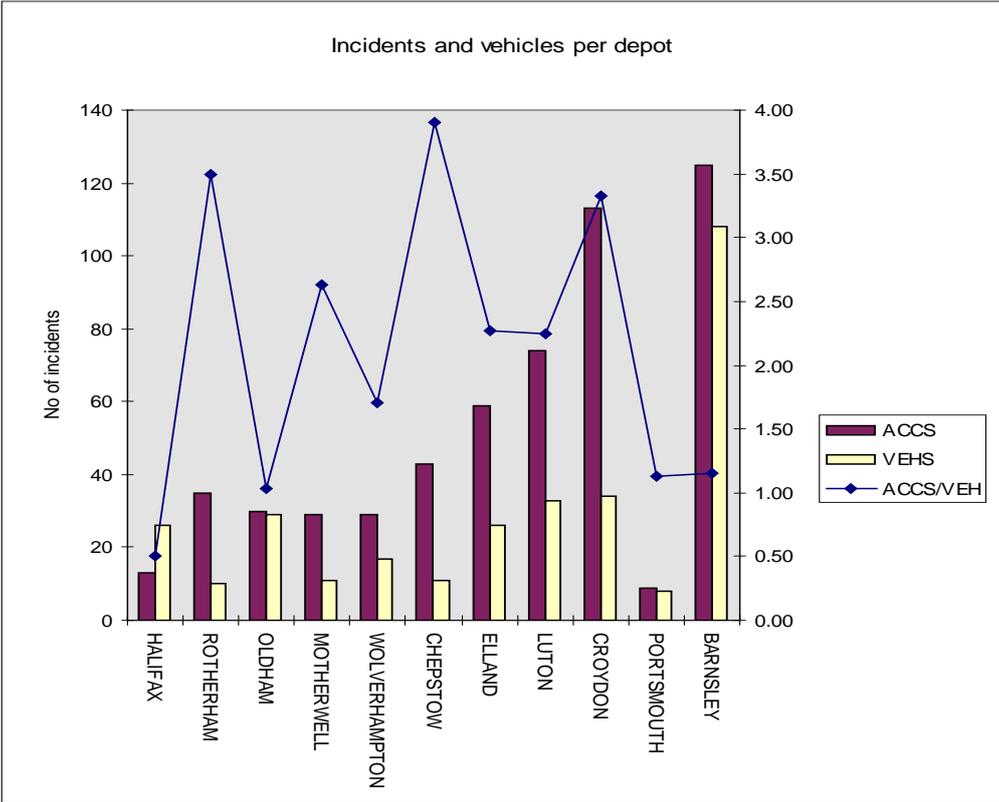
Table 2 shows how incidents can be related more closely to the working environment, and provides some potential key ratios that can be used for comparing individual drivers, depots and companies.

Table 2 - Incident ratios

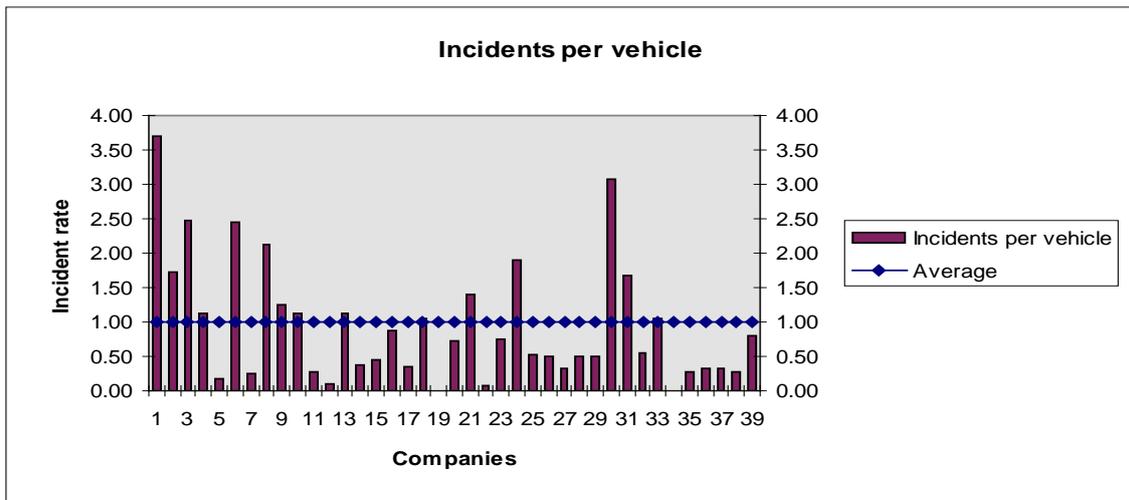
<b>Incident ratios</b>
incidents per vehicle
percentage of vehicles in an incident
incidents per million miles driven
hours, days or months driving per incident

Incidents per vehicle or percentage of vehicles in an incident are useful measures. They allow easy comparisons, for example, between depots as shown in Graph 2 or for benchmarking between organisations (Graph 3). Many companies use these ratios. They are limited, however, in that they cannot monitor individual drivers nor can they cope very easily with seasonality and the use of extra vehicles and drivers at peak times.

Graph 2 - Incidents by depot



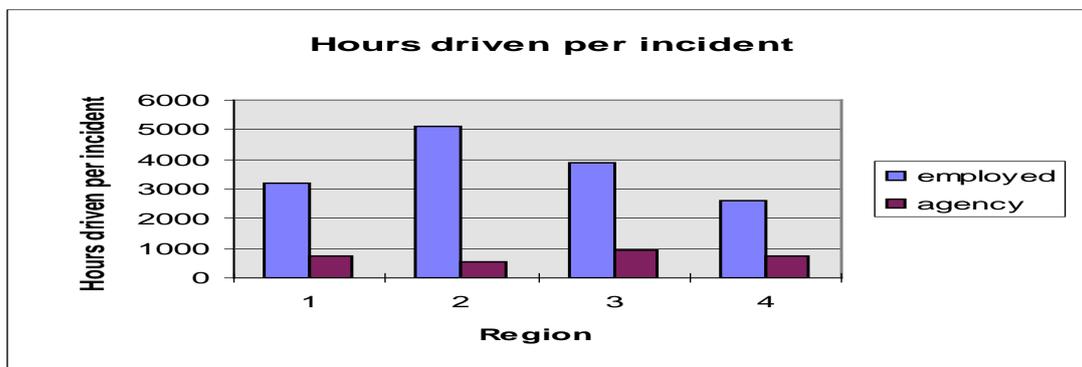
Graph 3 - Accidents per vehicle comparison across 39 companies



Incidents per million miles is a popular measure, at the Government and company level. It is useful in that it allows a comparison between individual drivers as well as between depots and organisations. It is limited, however, in that many drivers, supervisors and managers cannot easily relate to something like 0.5 incidents per million miles. Even a driver covering 100,000 miles per annum will take 10 years to cover a million miles. ‘Our rate is only 0.5 so we do not need to do anything to reduce the number of incidents’. Also it does not very easily distinguish between the long distance trunking and local urban delivery work undertaken by a fleet of commercial vehicles.

Hours, days or months driving per incident are probably the most useful of the measures shown in Table 2. They are easy to understand, can cater for seasonality and can be used at all levels from the individual driver upwards. These ratios can also easily monitor ‘own’ drivers against ‘temporary/agency’ drivers, as shown in Graph 4. Their main drawback is that more work is involved in collating the information on time worked by drivers, as well as the incidents themselves.

Graph 4 - Hours driven per incident between temporary and permanent staff



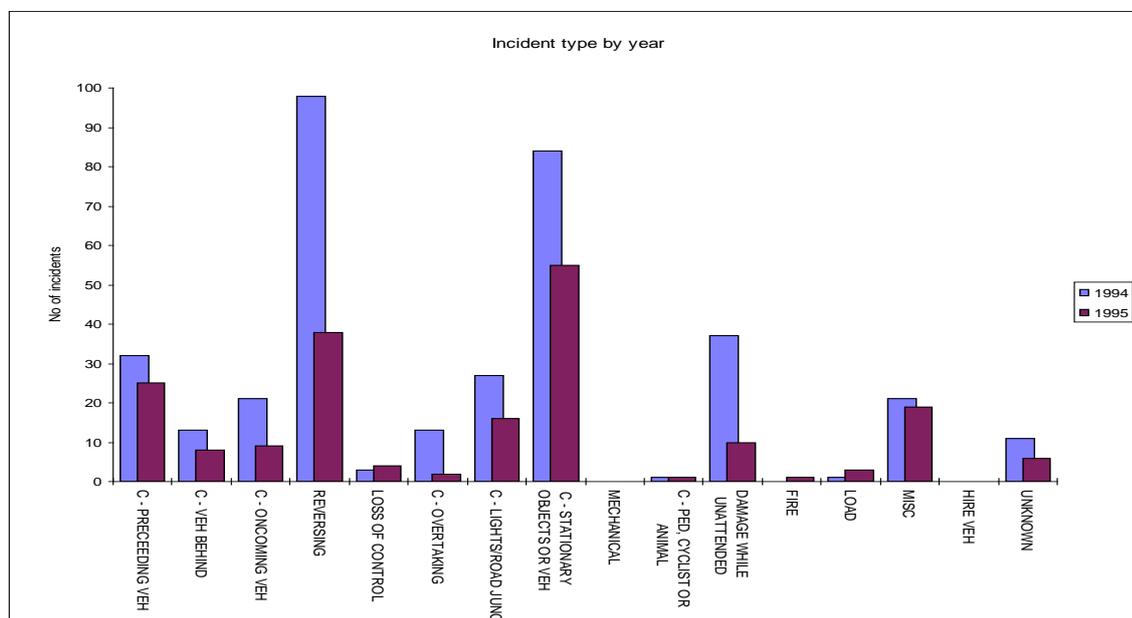
Other measures can relate to the efficiency of the accident reporting process, or to specific issues. Table 3 below shows several examples. The first two measures relate to the efficiency of the reporting process, which is often a problem. If specific areas are a target for incident

reduction, such as reversing and manoeuvring incidents, objectives can be set and then monitored. Graph 5 shows how reversing incidents were amongst those reduced as part of a programme to target manoeuvring incidents. A range of interventions, based on people, vehicles, sites and management can be implemented in relation to reversing incidents, a free paper on which is available from the author.

Table 3 - Examples of other measures

<b>Other measures</b>
time to report incident
level of unreported damage or 'unknowns'
specific areas (eg reversing or manoeuvring)

Graph 5 - Types of incidents by year (C = collision with)



Standards and objectives can be set against all the measures shown in Tables 1-3, which can then be monitored on a weekly, monthly, quarterly and annual basis to evaluate the success of the interventions made. This information can then be used to set up 'league tables' between sites or divisions for comparative purposes, although this 'competition' must not be allowed to lead to any under reporting of incidents. It is also possible to set up experiments using some sites or individual drivers as control groups, where no interventions are made. The data from these sites or drivers can then be compared with those where a programme has been implemented to test the effectiveness of the interventions. This is particularly useful if the interventions, such as driver training, involve an initial set up cost.

### 3 COSTS

However strong the moral issues are for reducing accidents, a reaction to high costs or a major incident has been the driving force in most accident reduction programmes. Any cost savings made through safety interventions go straight to the 'bottom line' profit margin of the

company. For example if your return on sales is 10% and your incident costs are £1 million per annum, you need to generate £10 million of sales just to cover the cost of the incidents. This cost relationship is a powerful argument for investing in transport safety, and a useful mechanism for focusing the mind of both senior management and local operational managers on the need for proactive accident reduction. A free ‘what-if’ cost model is available from the author.

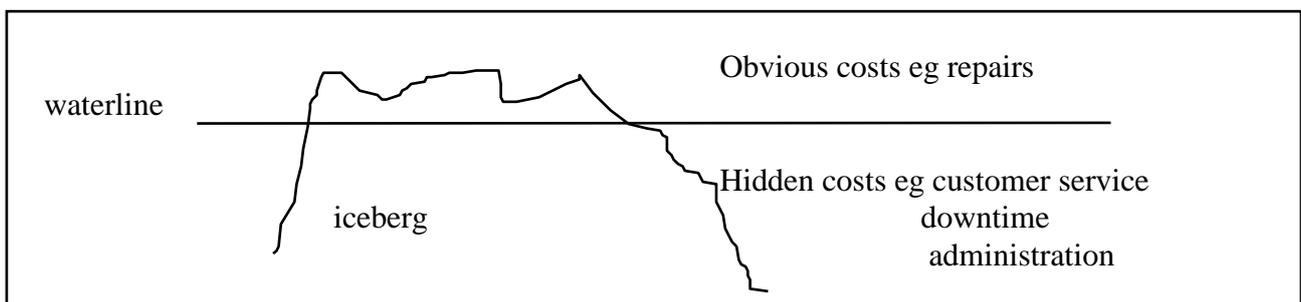
Normally vehicle operators focus on vehicle repairs and insurance costs. There are, however, many other costs that are more difficult to quantify than repairs and insurance, but the quantification of these can make the arguments in favour of investing in transport safety even greater. As a starting point it is vital to get an understanding of the full costs involved.

Costs can be split into those that are recoverable through insurance and those that are irrecoverable through insurance. Table 4 (next page) shows examples of these costs split down by vehicles, drivers, third parties and others. Whether these costs are recoverable or not depends very much upon individual cases, so vehicle operators should use the second column in Table 4 to assess the extent of their own hidden costs.

Even those costs in Table 4 that are recoverable through insurance can be a problem. The continued submission of claims will increase the annual premium costs and the size of the ‘excess’ paid on each incident. In many fleets the size of the excess is now over £1,000 which means that many costs are actually irrecoverable.

In our experience, most companies underestimate (choose to ignore?) the ‘real costs’ of their accidents by at least half! The Health and Safety Executive suggests that the below the water line ‘iceberg’ costs (Figure 1) can be eight to 36 times greater than those visible ‘above the water’. Driver trainers often argue that that hidden costs can be as much as six to 53 times the obvious costs in their sales presentations. Wherever you are in this range from twice as high to 53 times as high, there is clearly great potential for cost reduction by focusing closely on transport safety issues. Our cost models tend to be based at the conservative end of this range.

Figure 1 - The iceberg effect



Once these costs are fully understood and as far as possible quantified they can then be used to set standards and targets as part of the evaluation process of transport safety programmes. Cost measures by themselves are not enough, because a highly successful programme can be made to look a failure by one high cost incident. Cost must therefore be used in conjunction with the incident rates shown in Tables 1-3 above. As with the incident rates discussed earlier, vehicle operators do not know what the costs would have been without the programme. This

means that it is also useful for the evaluation to focus on qualitative and process issues as well as the outcomes in terms of incident rates and costs.

Table 4 - Costs after an incident

<b>Vehicle costs</b>	<b>recoverable/insured</b>
recovery and storage	yes/no
repair of vehicle	yes/no
vehicle downtime and replacement vehicle	yes/no
new vehicle if written off	yes/no
reduced resale value	yes/no
leased vehicle life costs if written off	yes/no
increased insurance excess and premiums	yes/no
<b>Driver costs</b>	<b>recoverable/insured</b>
loss of expertise	yes/no
lost productivity due to injury absence	yes/no
replacement driver - overtime, temporary driver	yes/no
medical and welfare	yes/no
compensation	yes/no
counselling	yes/no
reassessment and training	yes/no
<b>Third party costs</b>	<b>recoverable/insured</b>
vehicle damage	yes/no
property damage	yes/no
personal injury compensation	yes/no
inconvenience	yes/no
legal fees	yes/no
fines	yes/no
<b>Other costs</b>	<b>recoverable/insured</b>
redelivery	yes/no
missed/late delivery penalties	yes/no
customer service/good will/missed sales	yes/no
damaged/lost stock	yes/no
own property damage	
investigation time	yes/no
management and administration time	yes/no
image/reputation/PR	yes/no
increased congestion	yes/no
extra tax to cover road safety improvements	yes/no

#### 4 QUALITATIVE ISSUES

Transport safety and risk management are quality issues, and cannot be separated from ‘good’ planning, management and supervision. Qualitative issues focus particularly on the process as well as the outcomes of a programme. Involving and observing participants are important features. Those involved in the programme must be included in the evaluation of it and the

results must be fed back to them in a meaningful way as part of an on-going process of ‘selling’ and ‘keeping the safety message alive’.

Most companies say ‘we have a safety policy already’. Having a safety policy is, however, less than half of the story. The policy is no more than a starting point, and is of very little use if planners, managers and supervisors do not believe in it or do not implement it. You have to ‘do’ the policy, as well as just ‘have’ it. The way in which the policy is implemented is a qualitative process issue.

The effectiveness of training is also a qualitative issue. **Training must be needs based!** For example in many cases more than a quarter of incidents are when the vehicle is reversing. We have, however, seen few driver training programmes where anywhere near 25% of the course focuses on reversing or manoeuvring. The level of training is also a qualitative issue. Often transport safety training is focused on drivers, when in reality the knowledge, attitude and skills of managers, supervisors and schedulers are at least of equal importance.

A whole range of qualitative issues should be included when implementing and evaluating a transport safety programme. Typical examples are shown in Table 5.

Table 5 - Some qualitative measures to evaluate transport safety programmes

<b>Qualitative measures</b>
management attitude
opinion surveys (eg of drivers, supervisors and line managers) to evaluate the programme, and to involve them in the process
employee turnover and difficulty in recruiting staff if you have poor safety record
employee morale and job satisfaction
absenteeism, time off work and sickness levels
employee stress
employee relations
level of unreported damage
vehicle care, sympathy and general wear and tear
fuel utilisation
public relations (PR) issues

Involvement is a key issue in the success of any programme. This involvement must take place when the programme is being developed and be an important part of the evaluation process. Genuine involvement can also help to improve employee relations, morale and job satisfaction, as well as improving incident reporting and reducing the amount of unreported damage. Other qualitative ‘spin-offs’ from concentrating on the process, as well as the outcomes, can include increased vehicle sympathy, better fuel utilisation and some very positive PR.

Implementing a proactive and successful transport safety programme can often gain much more editorial in the trade press and at conferences and industry presentations than any amount of planned business development activity. This surely must help in terms of developing new business but also in terms of attracting and keeping more safety conscious managers and staff. Internal publicity, inside the company through in-house publications such

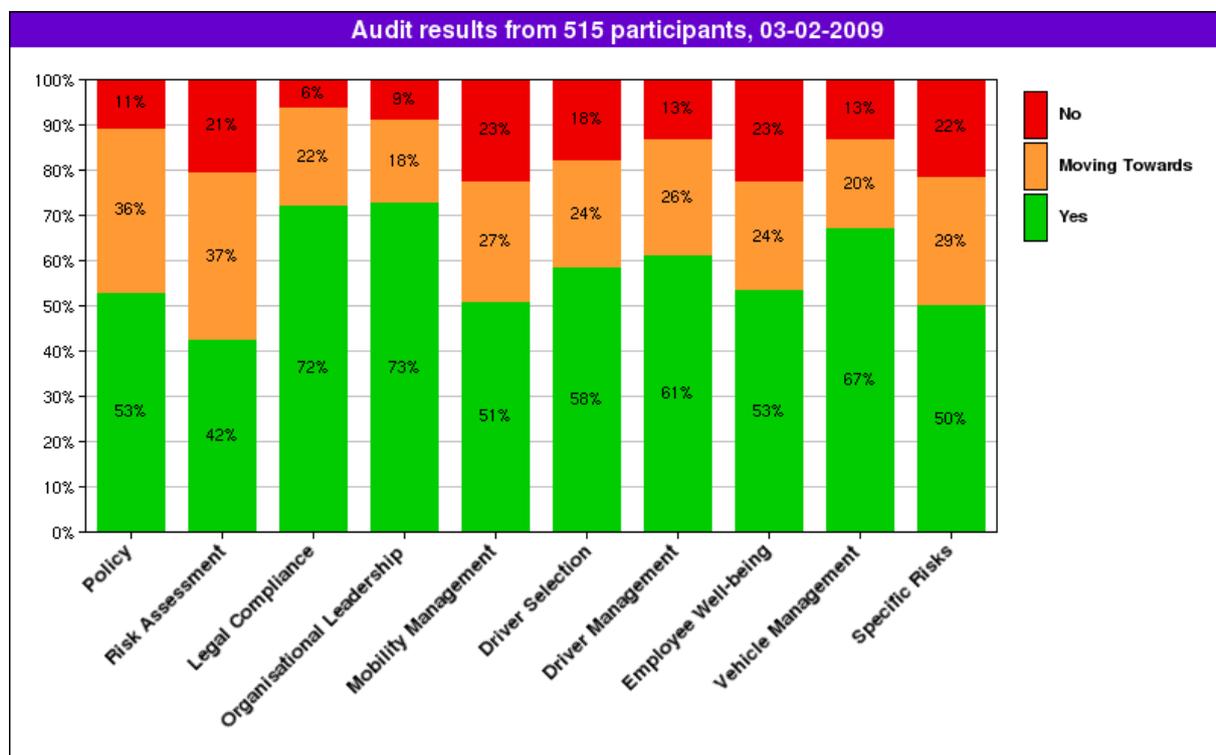
as newsletters, video, CD-ROM and online, is also useful in focusing attention to the safety issue. At the opposite extreme, reacting to events such as a major incident, will often mean trying to reduce the negative impact of a great deal of bad publicity.

When added to the incident rates and costs discussed earlier in this paper these more qualitative measures and issues help to make a very comprehensive and ongoing evaluation process.

## 5 CONCLUSION

This paper has reviewed the importance of evaluating transport safety and risk management programmes. The incident rates, costs and more qualitative issues discussed have provided a range of options for evaluating risk management programmes. These should be used regularly (weekly, monthly, quarterly and yearly), be easy to understand and as minimal as possible. Ideally they should be visual, and wherever possible, positive. The results of the evaluation should also be preventive rather than blame based, be part of the ongoing risk management process (Graph 6), highlight further issues to be addressed and help to develop standards and targets for future actions. A practical audit of your existing evaluation KPIs (both proactive and reactive) is provided in Appendix 1. To compare your process benchmarks against those shown in Graph 6, go to [www.fleetsafetybenchmarking.net](http://www.fleetsafetybenchmarking.net)

Graph 6 – Fleet safety process evaluation and benchmarking



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## Appendix 1: Process and outcomes evaluation key performance indicator (KPI) audit

Tick which of the following KPIs you use and how frequently to audit how comprehensive you are evaluating your occupational road safety, and any current evaluation-gaps.

KPI	Monthly	Quarterly	6-monthly	Yearly	Never
Average cost of claims per x kms					
Average crash cost					
Circle check results					
Claims per million kms					
Collision with					
Costs (vehicles, driver and third party)					
Costs a % of total fleet or maintenance					
Crashes per \$x turnover					
Crashes per driver					
Crashes per vehicle					
Crashes per X employees					
Crashes per x hours worked					
Crashes per x kms					
Customer service failures and complaints					
Damage while parked					
Date/Day					
Driver age/experience					
Driver supply agency performance					
Drivers' shift and sleep pattern					
Fault/non-fault (unavoidable/avoidable)					
Hours of assessment & training received					
Location					
Manoeuvre					
Miles/kms per crash					
Near misses					
Non-claim/minor/under excess crashes					
Number of crashes					
Purpose of journey					
Repeat offenders					
Shifts/months per crash					
Single vehicle crashes					
Terrain					
Third party type					
Time of day					
Time to report					
Type of crash					
Type of damage					
Underlying causes					
Uninsured losses/recoveries					
Unreported damage					
Vehicle downtime					
Vehicle manufacturer					
Vehicle type					
Vehicle use					
Violations eg speeding					
Wear and tear					
Other (please state)					